Plato ver. 14.1.3, and then optimised by internal algorithm for active source length of 10 cm (21 step positions) and reference depths of 5, 7 and 10 mm. TLD chips LIF 100 were used as the detectors after calibration in Co-60 photon beam and Harshaw 3500 as a reader. The catheter and TLD chips were placed in a wax-parafin phantom assuring the distance from the catheter to detectors equal to the reference depth (5, 7 and 10 mm). The measurements were preformed twice for every depth – for the non optimised treatment plan and for the plan with optimisation algorithm applied. The dose delivered at the reference distance was 10 Gy.

Results. The treatment plan was calculated for the active source length (ASL) of 10 cm. The RIL values calculated without optimisation of the step times, were: 8.9 cm, 9.28 cm and 8.96 cm. The measured RIL were: 8.64 cm, 9.6 cm, 8.32 cm (+/- 0.32 cm), for the RD = 5, 7 and 10 cm, respectively. For the optimised treatment plan, the calculated RIL were: 10.24 cm, 10.56 cm and 10.56 cm while the measured RIL were 10.24 cm, 10.56 cm and 9.92 cm (+/- 0.32 cm), for the RD = 5, 7 and 10 cm, respectively. The RIL measured during the treatment carried according to the optimised plan were by 1.60 cm, 0.96 cm and 1.60 cm longer then those for the treatment made without optimisation at the reference depths. The increase of the dose measured at the last distal and proximal position of the application were 35, 38 and 37% for RD = 5, 7 and 10 cm, respectively.

Conclusion. Optimisation of the treatment plan is the main tool for the accurate treatment delivery in endovascular brachytherapy. The TLD dosimeters showed the increase of the dose at distal and proximal parts of the active length (AL), and thus optimisation algorithm built in Plato ver. 14.1.3 has been proven to be correct for the above clinical situation.

161.
THE FREQUENT AND PRECISE MONITORING OF MUCOSAL REACTION DURING RADIATION THERAPY IN HEAD AND NECK CANCER PATIENTS AFFORDS POSSIBILITIES OF QUANTITATIVE REPORTING AND PREDICTING ITS SEVERITY

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Background. Numerous prospective clinical studies on acute radiation mucosal toxicity have been doing over the last 10 years in Gliwice Oncology Centre. Consequence of those experiences is the policy of detailed monitoring and reporting of many objective and subjective symptoms estimating the incidence and pattern of radiation mucositis.

Aim. To evaluate clinical and treatment-related factors influencing on duration of healing, incidence and severity of mucositis and overall duration of acute mucosal reaction.

Material and Methods. The unique data set of careful and frequent observations of mucosal radiation reaction in 88 consecutive patients (pts) with head and neck cancer treated by radiation alone have been included into the analysis. There were 35 pts treated by conventional fractionation with 2.0Gy per fraction and 4 pts with 2.5Gy per fraction (CF), 33 pts treated by accelerated fractionation (CAIR), 8 pts by hyperfractionation (HF), and 8 pts with glottic T1 cancer treated by hypofractionation of 3Gy per day (hF). All patients have been observed everyday with examination of oral cavity, pharynx and larynx done 3 times weekly, by the same, well experienced radiation oncologist, according to the own scoring system based on the Dische' suggestions. The monitoring of mucosal reaction has been always beginning at the 1st day of treatment, before radiation fraction, followed after the end of treatment, up to the disappearance of any symptom (except xerostomia), what was identified as a complete healing of mucosa.

Results. Radiation mucositis at least of the grade 2 (patchy stage) has been observed in all (100%) pts, usually beginning from the 11th day (range: 6-21). The confluent mucositis (grade 3) has noted in 87 pts (98%) with the median onset at 14th day (range: 6-39). Reaction of grade 4 (confluent mucositis occupying more than 50% of radiated mucosal area – CME>50) has been detected in 71 pts (81%) with the median appearance at 21st day (range: 9-42), remaining usually 24 days (range: 2-45) notwithstanding below or equal 7 days in 15 pts (21%). The incidence and duration of CME>50 has correlated significantly with the type of fractionation – 88% of pts treated by AF and HF developed CME>50 which took about 28 days, compare respectively to 77% of pts and 19 days for CF. Also the site of CME>50 origin (oral cavity+pharynx vs. larynx+hypopharynx) was connected significantly with its incidence and duration – 25th vs. 20th day and 25 days vs. 19 days, respectively. The most important factors associated directly with the time of mucosal healing were duration of mucositis and its supportive treatment, maximal total score, accumulated radiation dose (ADR), area of boost fields and total radiation dose, but adversely – onset of dysphagia and onset of mucosal oedema. The overall duration of mucosal reaction (i.e. time from the first day of irradiation up to its complete healing) was significantly connected directly with duration of mucositis and its supportive treatment, areas of radiation fields (initial, shrinking and boost), total dose, overall radiation treatment time (ORTT) and maximal total score, but adversely with site of reaction origin and with ARD. Finally, the prediction models of several mucosal reaction end-points have been created on the base of multiple regression function. The increasing number of symptoms (variables) collecting as the monitoring progressed has improved the fit of prediction model for crucial end-points, like duration of mucosal healing, overall duration of mucosal reaction, duration of CME>50 and maximal total score. The highest adjusted goodness-of-fit values (adR2) for prediction models estimated at the end of radiation treatment have reached at best to 0.75 (usually were ~0.5), what could meant at least 50% variability of that reaction depends on individual radiosensitivity of mucosal membrane.

Conclusions. 1. High rate of mucositis grade 4 during conventional fractionation, reaching 75%, has been in contrast with general opinion of its lower, 25% rate. Methodology of this study and relatively high proportion of patients (~20%), who experienced such a grade within a very short time (up to 7 days), suggests however, that literature data could be underestimated. 2. In spite of noted, well-known tendency that AF has prolonged the time of mucosal healing (on 7 days); the overall duration of mucosal reaction has been adversely influenced by ORTT and ARD, what has given per saldo 1 week shorter reaction for AF. It suggests that radiation-free weekends during CF are not thus important for mucosal healing like it has believed. The overall duration of mucosal healing in 5 fractions per week treatment is longer than for 7 fractions per week, provided that ARD does not exceed 12.6Gy per week and radiation fields delivered during the weekends are relatively small. 3. Frequent and careful monitoring of the whole course of radiation mucosal reaction seems to be essential for individual prediction of its severity and healing. This procedure claims to be clinically useful especially for aggressive altered fractionation or concomitant chemo-radiotherapy, i.e. for those therapeutic methods where traditional reporting on radiation mucosal toxicity has been neglected.

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IS INTENSITY MODULATION USEFUL IN RADIOSURGERY? AN ANALYSIS OF CLINICAL APPLICATIONS OF IMRS

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Introduction. Treatment modalities based on single fraction delivery demand